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ABSTRACT

Play therapy has been employed by therapists to alleviate children's emotional stress. Most research dealing with this type of intervention has been in the form of case studies, focusing on therapy outcome rather than on the therapeutic process. The process of one child in individual play therapy was analyzed through the use of time-series analysis. A 5-year-old boy, referred because of his social isolation and withdrawal in a classroom setting, participated in 8 weekly 45-minute play therapy sessions. Stimulus-response verbalizations were established as the dependent variable. A total of 21 30-minute measurements were taken twice weekly over an 11-week period: 6 pre-intervention time points and 15 post-intervention time points. A stochastic model was fit to the data; the time-series was stationary with no significant serial correlation present in the first five lags of the post-intervention data. Although a linear regression yielded a significant treatment effect, examination of the residuals using Q statistic revealed serial dependence, negating the model viability. An alternative statistical model was formulated which produced a significant treatment effect and confirmed the goodness-of-fit of the model. The results suggest that play therapy was a viable intervention for this child. (Author/NRB)

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The Effects of Play Therapy: A Case Study

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Abstract

A five-year-old male participated in eight weekly 45-minute play therapy sessions. Rather than evaluating the results of the child-centered approach in a typical case study manner, the researchers used time-series analysis to determine whether significant change had occurred.

The boy, Juan, was socially isolated and withdrawn in a classroom setting. Stimulus-response verbalizations were establisned as the dependent variable. Twenty-one 30-minute measurements were taken twice weekly over an 11-week period: six pre-intervention time points and 15 post-intervention time points.

A stochastic model was fit to the data; the time-series was stationary with no significant serial correlation present in the first five lags of the post-intervention data. Thus, linear regression was selected to test the results. To examine process, the independent variable, treatment, was coded to reflect the authors' hypothesis of a gradual increase of treatment effects with stabilization achieved within three weeks of the intervention. Although the regression did yield a significant treatment effect, examination of the residuals via the Q statistic revealed serial dependence and, hence, negated the viability of the model. An alternate statistical model was formulated which produced a significant treatment effect and

confirmed the goodness-of-fit of the model by means of examination of the residuals.

Play therapy, then, provided a viable intervention technique for Juan allowing him to become more verbally expressive in the classroom setting. The authors also described advantages of the time-series analysis in understanding the process and the outcome of therapy. In addition, potential additional uses of the statistical procedure are presented.

The Effects of Play Therapy: A Case Study

For over half a century play therapy has been employed by therapists of varying theroretical persuasions as a methodology for alleviating children's emotional stress. Both individual and group approaches have produced mixed results (Abramowitz, 1976). Generally, about a third of the studies indicate positive gain, a third produce negative findings, and a third result in mixed or ambiguous findings. Many factors have contributed to the varied results. For example, the same researchers have approached their work from different theoretical frameworks, measured different dependent variables, and applied different statistical methodologies to their data. In addition, there is a need for research that is both sound methodologically and broader conceptually (Abramowitz, 1976).

Most research so far has focused on therapy outcomes and not the therapeutic process. The majority of outcome studies have also been concerned with changes outside rather than inside the playroom setting (Howe and Silvern, 1981), e.g., changes in self-concept, ego-strength, or avoidance behavior.

Another difficulty with the existing research about play therapy is the use of some measure that was applied to all children who received treatment or were in control groups. In other words, all children were submitted to particular modes of treatment, were measured quantitatively on a variable preceding

treatment, and then following treatment were measured again. After applying various statistical techniques, the researchers concluded whether or not change occurred.

Those studies dealing with a qualitative analysis of behavior and the effectiveness of psychological interventions are usually in the form of case studies. Typically, data collected over time have been presented graphically without any statistical analysis, and the reader is left with the task of deciding the efficacy of the intervention based on a subjective interpretation of descriptive reports and visual inspection of data. Kratochwill (1978) argued that visual interpretation is unreliable when compared to statistical analysis of data. Gottman (1973) presented a cogent rationale for the application of time-series analysis to single-subject research in assessing process and outcome in psychotherapy. Glass, Willson, and Gottman (1975) demonstrated a technique involving data transformation that allowed a more accurate estimate of intervention effects in an interrupted time-series experiment.

A review of the literature revealed no research which looked at each child's idiosyncratic need for change, measured that, and then evaluated whether play therapy had been effective for the individual child, and, secondarily, for the children involved collectively. Instead, the researcher typically picks a dependent variable that is thought to be

applicable for all children in the research and under all conditions. Such an assumption may be false because the dependent variable may not reflect the individual subject's most compelling need for change. The present study is a first step in analyzing the process of one child in individual play therapy through the use of time-series analysis. Such an approach also offers the individual clinician a technique for evaluating his or her own therapy with each child.

Method

A five-year four-month-old Hispanic child, Juan, was referred for play therapy because of his social isolation and withdrawal in a classroom setting. Juan was also non-verbally aggressive, throwing occasional temper tantrums. Therapy consisted of eight weekly 45-minute sessions in a playroom at the University of Northern Colorado with a supervised graduate student therapist. The theoretical orientation of the therapist was child-centered in approach.

After consultation with the classroom teacher, it was decided that a measure of Juan's verbalizations with others would be an appropriate index of progress; the verbalizations needed to be clearly stimulus-response interaction for charting. Dependent variable measurements were taken twice weekly by the primary author during 30-minute observation periods. Twenty-one observations occurred over an 11-week

period: six pre-intervention time-points and 15 post-intervention time-points. An interview with both parents and teacher after data collection revealed no historical events that could have confounded the outcome. Although 40 to 50 time-points have been deemed the minimum for an accurate estimation of effects by some (Glass, et al., 1975), Zinkgraph (1980) demonstrated that a minimum of 20 time-points was sufficient for inferential analysis provided that the alpha level was adjusted to .001.

Results

The raw data, Juan's verbalizations over time, are presented in Figure 1. The first step in the analysis was to build a stochastic model that accurately described the data. To better describe the variability in Juan's behavior over time, the authors searched for any autoregressive or moving average processes that could bias the statistics. In keeping with the diagnostic procedures outlined by Box and Jenkins (1976) and also Glass, Willson, and Gottman (1975) for analyzing interrupted time-series data, both the pre- and post-intervention data were examined for evidence of autocorrelation, the degree of predictability between time-points. Although the pre-intervention data set was too small to find a meaningful coefficient, no significant autocorrelation was present in up to five lags of the

post-intervention data, confirming a lack of serial dependence among observations over time. (See Table 1.) Additionally, the absence of significant autocorrelation over a number of lags demonstrated that no deterministic drift, such as a maturation effect, occurred in the data. Thus, no autoregressive integrated moving average (ARIMA) parameters needed to be included in the model and fit to the data, and least-squares regression was selected as an appropriate statistical procedure to assess both process and outcome. The independent variable, a coded variable, modeled the effects of play therapy according to the authors' hypothesis, i.e., gradual change incrementally over time which reached an asymptote at three weeks. (See Figure 2.) Although the regression did yield a significant regression coefficient for the treatment effect ($\underline{b}$ = 81.05), $\underline{t}(19) = 5.63$, $p < .001$, an analysis of the residuals via the $\underline{Q}$ statistic demonstrated significant autocorrelation, suggesting that an inaccurate treatment model was fit to the data, $\underline{Q}(5) = 13.61$, $p < .05$. (See Table 2.)

An alternative treatment model was formulated which reflected the steady, gradual relaxing of Juan's inhibitions observed by the authors in the play therapy sessions. (See Figure 3.) Therefore, it was hypothesized that relationship skills strengthened and reinforced during play therapy sessions

would generalize to relationships outside of the therapeutic setting and did not include an eventual leveling-off process. Regression produced a significant coefficient for the treatment effect, (b = 91.27), $t(19) = 4.4$, $p < .001$. Analysis of the residuals using the Q statistic verified a lack of significant autocorrelation and confirmed the goodness-of-fit of the treatment model, $Q(5) = 8.34$, $p > .05$. (See Table 2.)

Discussion

For Juan, as can be seen from time-series analysis, play therapy provided a viable intervention technique which allowed him to be more expressive in his educational setting. Also, Juan's therapist and classroom teachers discovered advantages of using the time-series approach. For example, although gradual change seemed to occur in Juan's behavior, both in play therapy and in the classroom, observable change was questionable and subject to observers' biases until examined statistically. Even when the data were displayed graphically, interpretation was, at best, prodigal guesswork. Additionally, Juan's therapist obtained an accurate representation both of Juan's progress in therapy and of the potency of the techniques used in treatment via feedback from the model provided in data analysis. As researchers, the authors gained pertinent knowledge regarding the process of therapeutic change with one youngster, thus adding to a largely subjective,

theoretically-oriented body of knowledge. Such information would be particularly useful in combination with other time-series analyses involving single-subject quasi-experiments in play therapy.

It may be argued that numerous models exist which appear to fit the data and that random selection would eventually produce a statistically significant model. The authors used stringent diagnostic checks throughout the model-building process to reduce the probability of a Type I error. As an additional precaution, the alpha level was raised to .001 because of the relatively few time-points used in the data analysis. The robustness of model-building and analysis of ARIMA processes has been demonstrated by Zinkgraf (1980). Some researchers may believe that a simple t test should suffice for testing the efficacy of treatment with time-series data; however, the analysis described in this paper was particularly important to the authors who intended to examine play therapy process as well as outcome.

A valid criticism of the present study may be the potential bias introduced by having one of the authors collect the data. Inter-rater reliability estimates would have been useful in demonstrating the absence of experimenter bias. On the other hand, by operationalizing the concept "verbalizations," data collection was protected from being

inadvertently biased. Since the technique outlined above can be extremely useful for clinicians attempting to judge their own clients' progress, the authors advocate choosing discrete dependent variables to reduce the possibility of bias.

Time-series analysis is the most appropriate means of examining both the process and the outcome of psychotherapy. Careful detail to model-building is required to identify any ARIMA processes and fit the appropriate parameters to the model. Once the correct stochastic model has been identified and verified, treatment effects may then be examined. Although clinical "intuition" is useful in the process of psychotherapy, time-series analysis provides an objective means to obtain feedback regarding the efficacy of a particular technique with a given client. Another potential benefit of this approach is for the clinician and the client to jointly evaluate the treatment by comparing the predicted time-points to the actual data. In research, time-series analysis compensates for the loss of individuality that occurs when clients are statistically examined by means of pre-post-intervention measurements compared collectively. More N-of-one research is needed in process and outcome regarding all modalities of psychotherapy. Meta-analyses utilizing numerous groups of single-subject studies could yield far more information than traditional pre-, post- studies.

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Table 1

Autocorrelation Coefficients and Standard Errors of Post-Intervention Data

Lag	Autocorrelation Coeficient	Standard Error
1	-.03	.26
2	.22	.26
3	.38	.27
4	-.42	.30
5	.14	.34

Table 2

Autocorrelation Coefficients

of Post-Intervention Residuals

	Treatment Model	
Lag	1	2
1	-.55	-.26
2	-.08	.10
3	.54	.42
4	-.56	-.53
5	.24	.14

Figure 1

Raw Data: Pre-, Post-Intervention Time-Points

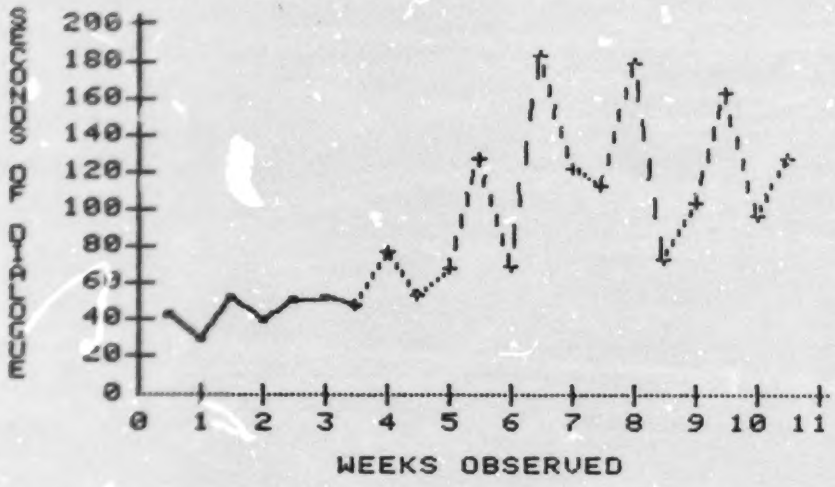

Figure 2

Predicted Treatment Effects: Model 1

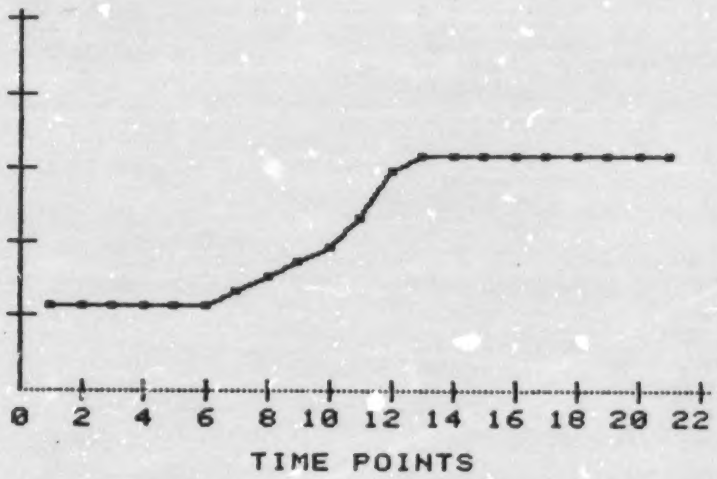

Figure 3

Predicted Treatment Effects: Model 2